ALBERTA
POWER COMMISSION

ANNUAL REPORT

1960

GOVERNMENT OF THE PROVINCE OF ALBERTA

—o—

ANNUAL REPORT

OF THE

ALBERTA POWER COMMISSION

FOR THE YEAR ENDING

DECEMBER 31, 1960

EDMONTON

—o—

J. G. MacGREGOR

CHAIRMAN

January 31st, 1961

The Honorable A. Russell Patrick,
Minister of Industry and Development,
Legislative Building,
Edmonton, Alberta.

Sir:

I have the honor to submit herewith the Annual Report of the Alberta Power Commission for the calendar year ended December 31st, 1960.

An audited statement of receipts and disbursements of the Alberta Power Commission will be sent under separate cover.

Respectfully submitted,

ALBERTA POWER COMMISSION

J. G. MacGregor,
Chairman.

ALBERTA POWER COMMISSION

1960

J. G. MacGregor,
Chairman

J. E. Oberholtzer,
Member

W. C. Whittaker,
Member

J. L. Reid,
Member
and Secretary

PREFACE

The Alberta Power Commission is not an operating Commission; that is, it does not own or operate any power plants, transmission lines or distribution systems. In this respect it is different from the Power Commissions in all the other Provinces, except Prince Edward Island and Newfoundland. Keeping this in mind, it might be well to consider the duties and the responsibilities of the Power Commission. Its duties at present, under the Power Commission Act, are only those of a regulatory or supervisory nature. These duties are largely covered by Section 6 of the Power Commission Act, which is as follows:

"Whenever required so to do by the Lieutenant Governor in Council the Commission shall inquire into, examine and investigate, -

(a) water powers and water privileges in Alberta, their value and capacity;

(b) the existing facilities for the manufacture and distribution of power in Alberta;

(c) such other matters relating to power and its distribution in Alberta as the Lieutenant Governor in Council from time to time may require;

and shall report thereon to the Lieutenant Governor in Council."

The Commission feels that its principal duties at the present time are threefold:

1. The collection of statistics of the Electrical Utility Industry in the Province, and the study of these statistics so that the people of the Province will have a true picture of the industry.
2. The study of hydro-electric sites and other power possibilities in the Province. The Commission also has been engaged in a study of the existing network of transmission lines in the Province with particular reference

to more extensive interconnection which will ensure the most efficient use of the large generating units which are already in operation and of those anticipated in the future.

3. Farm Electrification. This is a phase of its work to which the Commission has devoted much of its time. The main network of farm electrification lines is now practically completed. From here on, with very few exceptions, the additional farms to be electrified will be adjacent to existing lines. While the construction phase of farm electrification is almost over, problems of operating the farm lines are now taking much more time. The Commission is presently engaged in rather detailed studies of the deposit reserves of individual R.E.A.'s.

Calgary Power Limited Photo

Spray Hydro Plant showing second unit penstock - **Total capacity 124,000 horse power.**

ALBERTA POWER COMMISSION

ANNUAL REPORT

For Year Ending December 31st, 1960.

Although the rate of expansion in Alberta slowed somewhat during 1960, the year was one of general prosperity. An active program of construction of new manufacturing plants was under way in 1960 and is in prospect for 1961. Some of these plants came into operation in 1960 but the majority will be completed and in full operation during 1961. Among the major plants coming into operation during 1960 were two rubber tire plants, two big inch pipe mills, oil refineries and gas processing plants, and a fibreglass insulation plant. During 1961 several more gas processing plants, two meat packing plants, three petrochemical plants, and an evaporated milk plant, will be in full operation. Gas and oil drilling activity continued during the year and several new oil fields were connected to the transmission system.

The K.W.H. generated per capita, which is a good indicator of conditions, continue to increase. Alberta's population increased at about the usual rate and the K.W.H. generated per capita increased from 2,277 to 2,436. Ten years ago, in 1950, this per capita figure was 952, so that the average person in Alberta is now using two and one-half times as much electricity as he did ten years ago.

The following comments provide a few figures for quick reference to indicate the remarkable growth of the Electric Utility Industry. The figures compiled in this report are confined to the Electric Utility Industry and are comparable to those compiled by the Dominion Bureau of Statistics under the category of "Utilities".

K.W.H. Generated. The increase in K.W.H. generated over that of the previous year was 10%. Thermal plants generated 69% of the K.W.H. produced. Of this, internal combustion plants accounted for about the same proportion (2.3%) as they did during the previous year. This power, of course, is mainly that generated by Northland Utilities Limited and Canadian Utilities Limited in the Peace River country and includes the power generated by the gas turbine at Valleyview. Canadian Utilities Limited operates a diesel plant in the Swan Hills oilfield where the load has been growing rapidly.

Peak Load. The increase in peak load for the Province has been 10% over that for the year 1959. Due to the fact that we have had two or three mild winters the peak load has not reached the heights which we might have expected if cold weather had prevailed. We may look for a considerable jump in peak load whenever we experience a severe December. The following figures are an estimate of the actual coincident peak for the Province.

System	Estimated Peak Load K.W., 1960
Interconnected system, less East Kootenay Power Co. Ltd. and Northland Utilities Limited	694,000
East Kootenay Power Co. Ltd.	2,200
Canadian Utilities Ltd. (North Division and Isolated Towns)	11,940
Northland Utilities Ltd.	10,855
	718,995
	say, 719,000

Transmission lines in the Province increased by 484 miles to a total of 13,126, which includes 3,030 miles of Company-owned farm lines. Distribution line mileage increased 355 miles to 5,034. The total mileage of all farm lines increased by 1,695 miles, so that the total farm mileage at the end of 1960 was 39,691. The total mileage of all power lines in the Province at the end of December, 1960, was 54,821.

Tables No. 1 to 8, which follow, provide the summary of the most recent statistics.

Table No. 1 shows the capacity in M.W. of the Utility Electric Stations in Canada for the past several years.

TABLE NO. 1

Capacity of Utility Electric Stations
M.W.

Year	Alberta	Canada	Saskatchewan	Manitoba
1948	165	7,491	218	350
1949	207	7,939	232	350
1950	208	8,734	234	445
1951	280	9,724	272	457
1952	288	10,613	322	542
1953	372	11,687	347	561
1954	504	12,479	356	561
1955	477	13,422	394	637
1956	572	* 12,463	415	637
1957	596	13,444	452	644
1958	718	14,758	529	741
1959	750			
1960	917			

Increase during the 10 year period ended 1958

Year	Alberta	Canada	Saskatchewan	Manitoba
1958	718	14,758	529	741
1948	165	7,491	218	350
Increase:	553	7,267	311	391
Percent Increase:	335%	97%	143%	112%

Increase Alberta: 1950 to 1960 - 341%

* In 1956 the D.B.S. changed its classification of statistics from Central Stations to Utilities.

Except for Alberta the figures from 1948 to 1958 have been taken from D.B.S. publications. Alberta figures are those compiled by the Alberta Power Commission.

Table No. 2 shows the growth of K.W.H. generated net during the past several years.

TABLE NO. 2

Electric Energy Generated by Utilities

(Millions of K.W.H.)

Year	Alberta	Canada	Saskatchewan	Manitoba
1949	793	37,595	841	2,164
1950	857	41,431	888	2,453
1951	984	48,055	968	2,562
1952	1,146	51,841	1,068	2,696
1953	1,298	53,340	1,161	2,791
1954	1,485	55,334	1,280	2,937
1955	1,707	61,642	1,409	3,102
1956	1,996	68,845	1,537	3,331
1957	2,249	71,522	1,678	3,341
1958	2,474	75,953	1,809	3,214
1959	2,828	82,538	1,987	3,594
1960	3,126			

Increase during the 10 year period ended 1959.

Year	Alberta	Canada	Saskatchewan	Manitoba
1959	2,828	82,538	1,987	3,594
1949	793	37,595	841	2,164
Increase:	2,035	44,943	1,146	1,430
Percent Increase:	257%	119%	136%	66%

Increase Alberta: 1950 to 1960 - 265%

The figures from 1949 to 1959 have been taken from D.B.S. publications. 1960 figures for Alberta are those compiled by the Alberta Power Commission.

TABLE NO. 3

Annual K.W.H. used per Domestic and Farm Customer

Year	Alberta	Canada	Saskatchewan	Manitoba
1948	989	2,078	1,115	4,628
1949	1,073	2,168	1,199	4,694
1950	1,224	2,413	1,353	4,783
1951	1,384	2,617	1,531	4,813
1952	1,473	2,809	1,677	4,868
1953	1,624	3,008	1,878	4,960
1954	1,865	3,271	2,072	5,229
1955	1,975	3,500	2,483	5,420
1956	2,256	3,740	2,361	5,636
1957	2,373	3,960	2,577	5,895
1958	2,532	4,128	2,696	6,113

These are Dominion Bureau of Statistics figures.

Increase during the 10 year period ended 1958

Year	Alberta	Canada	Saskatchewan	Manitoba
1958	2,532	4,128	2,696	6,113
1948	989	2,078	1,115	4,628
Increase:	1,543	2,050	1,581	1,485
Percent Increase:	156%	99%	142%	32%

Manitoba has an exceptionally high figure for K.W.H. used per domestic customer. This is partly due to the fact that one city alone - Winnipeg - contains a large percentage of the total population of the Province. It is also due to the fact that the cost of developing the water power sites adjacent to Winnipeg was possibly the cheapest in the world. This provided cheap power for the people of the City of Winnipeg, and since fuel was expensive there, electricity was used extensively for cooking and heating, and a happy combination of low rates produced high use, and vice versa.

The figures for Canada for K.W.H. used per year per domestic customer is high because it takes into account the high consumption in Manitoba and Ontario.

TABLE NO. 4

Costs in Cents per K.W.H. Domestic Customers Only

Year	Alberta	Canada	Saskatchewan	Manitoba
1948	3.72	1.60	4.09	1.06
1949	3.54	1.59	3.95	1.11
1950	3.28	1.61	3.80	1.15
1951	3.16	1.65	3.70	1.18
1952	3.06	1.65	3.59	1.21
1953	2.91	1.70	3.52	1.23
1954	2.75	1.69	3.39	1.25
1955	2.64	1.66	2.93	1.18
1956	2.51	1.64	3.17	1.15
1957	2.44	1.62	3.11	1.13
1958	2.40	1.61	3.08	1.06

These are Dominion Bureau of Statistics figures.

Decrease during the 10 year period ending 1958

Year	Alberta	Canada	Saskatchewan	Manitoba
1948	3.72	1.60	4.09	1.06
1958	2.40	1.61	3.08	1.06
Percent Decrease	36%	Increase 1%	Decrease 25%	Increase -

TABLE NO. 5

Total Number of Customers of Utilities
(Thousands)

Year	Alberta	Canada	Saskatchewan	Manitoba
1948	142	2,822	106	151
1949	157	3,076	114	163
1950	172	3,270	121	179
1951	186	3,440	127	194
1952	200	3,621	139	209
1953	221	3,817	151	221
1954	239	4,002	170	234
1955	267	4,225	185	243
1956	276	4,412	206	254
1957	295	4,597	220	258
1958	316	4,798	230	267
1959	* 336			
1960	* 355			

Increase during the 10 year period ending 1958

Year	Alberta	Canada	Saskatchewan	Manitoba
1958	316	4,798	230	267
1948	142	2,822	106	151
Increase:	174	1,976	124	116
Percent Increase:	123%	70%	117%	77%

* Figures marked thus are Alberta Power Commission figures, and others are from the Dominion Bureau of Statistics

TABLE NO. 6

Number of Farms Served by Utilities
as at December 31 each year

Year	* Alberta	Saskatchewan	Manitoba
1950	11,032	4,057	16,964
1951	13,479	5,594	23,777
1952	18,055	8,591	29,623
1953	24,181	13,850	33,601
1954	30,504	21,287	37,422
1955	34,768	28,993	38,277
1956	37,658	38,495	38,091
1957	41,130	44,955	38,120
1958	45,848	50,813	38,700
1959	49,923	* 55,121	
1960	53,151		

TABLE NO. 7

Consumption in K.W.H. per Farm per Year

Year	Alberta	Canada	Saskatchewan	Manitoba
1949	2,128	1,752	880	2,113
1950	2,250	1,932	880	2,359
1951	2,461	2,085	1,266	2,475
1952	2,747	2,228	1,527	2,666
1953	2,604	2,420	1,915	2,943
1954	2,958	2,672	2,053	3,541
1955	* 2,892	2,803	2,054	3,564
1956	* 3,040	3,060	2,217	3,911
1957	* 3,564	3,415	2,490	4,238
1958	* 3,530	3,686	2,670	4,586
1959	* 3,979			
1960	* 4,055			

* Figures marked thus are Alberta Power Commission figures, and others are from the Dominion Bureau of Statistics.

TABLE NO. 8

Total Pole Line Mileage
(Includes transmission, distribution and rural lines)

Year	Alberta	Canada	Saskatchewan	Manitoba
1949	10,103	135,329	5,371	16,785
1950	12,108	151,726	5,712	20,472
1951	15,125	170,582	9,574	24,439
1952	20,188	190,316	13,858	28,514
1953	26,211	213,176	20,899	32,237
1954	* 31,736	228,158	26,177	33,615
1955	* 36,233	243,773	33,755	33,219
1956	* 39,430	265,389	44,516	34,232
1957	* 43,404	285,306	54,700	34,317
1958	* 48,721	311,511	68,852	35,111
1959	* 52,368			
1960	* 54,821			

* Figures marked thus are Alberta Power Commission figures, the others are from the Dominion Bureau of Statistics.

TABLE NO. 9

K.W.H. Generated per Capita in Alberta

Year	Population	K.W.H. Generated x 10^6	K.W.H. Generated/Capita
1950	913,000	869	952
1951	939,000	1,055	1,123
1952	970,000	1,213	1,250
1953	1,002,000	1,341	1,338
1954	1,039,000	1,499	1,443
1955	1,066,000	1,728	1,621
1956	1,123,000	2,019	1,798
1957	1,160,000	2,243	1,934
1958	1,201,000	2,474	2,060
1959	1,243,000	2,830	2,277
1960	1,283,000	3,126	2,436

PRESENT STATUS OF THE INDUSTRY

The Statistics for the Electric Utilities for the year 1960 follow: Some of the minor figures are estimates only due to the fact that the report has to be prepared before the various utilities have completed their statistics for the past year. These minor estimates will not be in error by more than 1% or 2%, so that the error in the whole will be negligible. Wherever we have estimated a figure it is marked "est."

Tables No. 10 to 13 deal with plant capacity, peak load, and K.W.H. generated. They break up the figures to show what was generated by hydro, steam and internal combustion engines, and also to show the proportions generated by the publicly owned and the privately owned plants. Table No. 13 gives further details of the generating plants and their output. It will be noted that it is divided into three groups, A., B., and C.

The largest, Group A., contains those power plants which are connected by transmission lines, so that we speak of them as being in the interconnected system. This group which covers most of the Province includes towns served by Calgary Power Ltd., Canadian Utilities Limited (excluding areas shown under B. and C.), the Athabasca system of Northland Utilities Limited, the cities of Edmonton, Calgary, Lethbridge, Red Deer and Medicine Hat, and the Towns of Ponoka, Fort Macleod and Cardston. Some of these do not generate their own power but purchase it from Calgary Power Ltd., and retail it to their inhabitants. This group includes the hydro plants of Calgary Power Ltd., which are rated as follows:

James Lovick & Company Photo

Electricity on an industrialized farm.

Plant		Capacity	
		H.P.	K.W.
Bearspaw	-	22,000	17,000
Ghost	-	67,450	51,000
Horseshoe	-	20,000	14,000
Kananaskis	-	24,000	19,000
Barrier	-	16,000	13,000
Cascade	-	46,000	36,000
Rundle	-	63,000	47,000
Spray	-	124,000	100,000
Three Sisters	-	3,600	3,000
Pocaterra	-	18,400	15,000
Interlakes	-	6,900	5,000
		411,350	320,000

Group B. takes in the Peace River country and includes the territory served by Canadian Utilities Limited and Northland Utilities Limited. The systems of these companies are tied together by transmission lines from Fairview to Rycroft and from Valleyview to High Prairie, so that now the whole of the Peace River country is one interconnected system.

Group C. includes various isolated towns served either by Northland Utilities Limited or by Canadian Utilities Limited.

In 1960 the interconnected system shown as Group A. had a combined capacity of 883,120 K.W., and generated 3,050,342,000 K.W.H. It served 339,414 customers. This system accounts for 96% of the generating capacity of the Province, 98% of the K.W.H. generated, and 96% of the number of customers.

The Peace River country interconnected system shown as Group B. had a combined capacity of 27,200 K.W. and generated 65,258,000 K.W.H. and served 14,276 customers.

TABLE NO. 10

The following Companies or Municipalities provide Central Station Electrical Service in the Province. This table gives preliminary data as to their plant capacity, their loads, and the K.W.H. they generated net in 1960.

Privately Owned

Name of Company	Plant Capacity Dec. 31/60 K.W.	Peak Load (KW) on plants during 1960	K.W.H. Gen. Net - 1960 (thousands)
1.			
Calgary Power Ltd.	464,000	419,400	1,796,540
Canadian Utilities Ltd.	86,850 (1)	65,040	277,809 (2)
Northland Utilities Ltd.	16,763	10,855	28,070
East Kootenay Power Co. Ltd. (3)	12,500	9,800	2,023
1. Total:	580,113		2,104,442

Publicly Owned

Name of Municipality			
2.			
City of Edmonton	260,000	186,000	646,170
City of Lethbridge	33,500	16,800	65,825
City of Medicine Hat	43,400	41,300	310,112 (4)
2. Total:	336,900		1,022,107
Plus 1. Total:	580,113		2,104,442
GRAND TOTAL:	917,013		3,126,549

(1) Includes one 1,200 K.W. unit at Fairview.

(2) Includes some K.W.H. generated at Fairview.

(3) The East Kootenay Power plant is located at Sentinel some two or three miles inside the Alberta border. While this energy is generated in Alberta, most of it is exported to British Columbia.

(4) Includes 223,942,300 K.W.H. sold to Calgary Power Ltd.

TABLE NO. 11

It is interesting to rearrange the figures of Table No. 10 so as to list them according to whether the power was generated by hydro, steam or internal combustion plants.

HYDRO

Name of Company	Plant Capacity Dec. 31/60 K.W.	Peak Load (KW) on plants during 1960	K.W.H. Gen. Net - 1960 (thousands)
Calgary Power Ltd.	320,000	278,400	881,855
Northland Utilities Ltd.	1,432	800	4,803
Total Hydro	321,432		886,658

STEAM

Calgary Power Ltd.	144,000	149,000	914,678
Canadian Utilities Ltd. (5)	68,500	53,100	228,758
East Kootenay Power Co. Ltd. (1)	12,500	9,800	2,023
City of Edmonton (7)	260,000	186,000	646,170
City of Lethbridge (7)	33,500	16,800	65,825
City of Medicine Hat	43,400	41,300	310,112 (2)
Total Steam	561,900		2,167,566

INTERNAL COMBUSTION

Calgary Power Ltd.			7
Canadian Utilities Ltd. (6)	18,350 (3)	11,940	49,051 (4)
Northland Utilities Ltd.	15,331	10,055	23,267
Total Internal Combustion	33,681		72,325
GRAND TOTAL	917,013		3,126,549

(1) See footnote (3) on Table No. 10.

(2) Includes 223,942,300 K.W.H. sold to Calgary Power Ltd.

(3) Includes 1,200 K.W. unit at Fairview.

(4) Includes some K.W.H. generated at Fairview.

(5) Includes Gas Turbine - Vermilion.

(6) Includes Gas Turbine - Valleyview.

(7) Includes Gas Turbine.

TABLE NO. 12

The following table may be of interest as showing the relative position of steam, hydro and internal combustion in the Province, December 31, 1960.

Method of Generation	% of Power Generated	% of Capacity
Hydro	28.4	35.0
Steam & Gas Turbine	69.3	61.3
Internal Combustion	2.3	3.7
	100	100
Publicly owned	32.7	36.7
Privately owned	67.3	63.3
	100	100

TABLE NO. 13

SUMMARY OF GENERATING PLANTS IN ALBERTA

AS AT DECEMBER 31, 1960

Owner	Hydro		Steam		Internal Combustion	
	K.W. Rating	K.W.H. generated, 1960 (thousands)	K.W. Rating	K.W.H. generated, 1960 (thousands)	K.W. Rating	K.W.H. generated, 1960 (thousands)
A. Within the interconnected system						
Calgary Power Ltd. (only)	320,000	881,855	144,000	914,678		7
Canadian Utilities Ltd.			68,500 (1)	228,758 (1)		
East Kootenay Power Co. Ltd.			12,500	2,023		
City of Edmonton			260,000 (1)	646,170 (1)		
City of Lethbridge			33,500 (1)	65,825 (1)		
Athabasca System (N.U.L.)					1,220	914
City of Medicine Hat			43,400	310,112		
TOTAL GROUP A:	320,000	881,855	561,900	2,167,566	1,220	921
B. Peace River Interconnected System						
Canadian Utilities Ltd.					17,000 (1)	47,138 (1)
Northland Utilities Ltd.					10,200	18,120
TOTAL GROUP B:					27,200	65,258
C. Isolated Systems						
Northland Utilities Ltd.						
Jasper	1,432	4,803			2,190	1,802
Lac La Biche					1,165	1,922
Misc. Small Plants					556	509
Canadian Utilities Ltd.						
McMurray					475	1,248
Smith					425	488
Misc. Small Plants					450	177
TOTAL GROUP C:	1,432	4,803			5,261	6,146
TOTAL ALL GROUPS:	321,432	886,658	561,900	2,167,566	33,681	72,325
GRAND TOTAL:		917,013		3,126,549		

(1) Includes gas turbines

TABLE NO. 14

Total Circuit Miles of Transmission Lines in the Province by Regional Groups as at December 31, 1960. This includes Company-owned Farm Lines, but does not include the Co-operative-owned Farm Lines.

	VOLTAGE				
	2,300 to 22,000 V.	33,000 V	50,000 to 72,000 V	132,000 V & greater	Total
A. Within the Interconnected System					
Calgary Power Ltd.	7,072	29	1,079	1,172	9,352
Canadian Utilities Ltd.	1,640	217	555	143	2,555
City of Medicine Hat	32				32
East Kootenay Power Co. Ltd.	26		48		74
Athabasca System	50				50
Total Group A.	8,820	246	1,682	1,315	12,063
B. Systems within the Peace River Country					
Canadian Utilities Ltd.	335	30	215		580
Northland Utilities Ltd.	305		130		435
Total Group B.	640	30	345		1,015
C. Isolated Towns					
Northland Utilities Ltd.					
Jasper	27				27
Lac La Biche	15				15
Canadian Utilities Ltd.					
McMurray	6				6
Total Group C.	48				48
TOTAL ALL GROUPS	9,508	276	2,027	1,315	13,126

TABLE NO. 15

SUMMARY OF DISTRIBUTION SYSTEMS IN ALBERTA

As at December 31, 1960

	Total Number of Customers Served (Includes Rurals)	K.W.H. Sold (Less Sales to other Co's.) (thousands) (Includes Rurals)	Circuit Miles of Line (Excludes Rurals)
A. Within the Interconnected System			
Calgary Power Ltd.	112,000	1,097,000	1,780
Canadian Utilities Ltd.	36,144	180,994	606
East Kootenay Power Co. Ltd. (1)	1,165	4,525	26
City of Edmonton	80,538	555,936	794
City of Calgary	80,776	604,946	895
City of Lethbridge	11,105	60,986	126
City of Medicine Hat	8,156	86,170	141
City of Red Deer	5,084	30,759 (Est.)	96
Town of Cardston	944	3,146	30
Town of Fort Macleod	895 (Est.)	2,580 (Est.)	21 (Est.)
Town of Ponoka	1,400	5,846	25
Athabasca System	1,207	3,800	37
TOTAL GROUP A:	339,414	2,636,688	4,577
B. Systems Within the Peace River			
Canadian Utilities Ltd.	7,626	33,510	228
Northland Utilities Ltd., including High Prairie, McLennan, Valleyview and Manning	6,650	18,600	167
TOTAL GROUP B:	14,276	52,110	395
C. Isolated Towns			
Northland Utilities Ltd.			
Jasper	728	6,500	24
Lac La Biche	444	1,830	11
Misc. Small Plants	120	456	13
Canadian Utilities Ltd.			
McMurray	334	1,249	10
Smith	86	464	2
Misc. Small Plants	52	153	2
TOTAL GROUP C:	1,764	10,652	62
G R A N D T O T A L :	355,454	2,699,450	5,034

(1) Includes Towns of Coleman, Frank, Cowley, etc.

TABLE NO. 16

SUMMARY OF RURAL ELECTRIFICATION SYSTEMS IN ALBERTA
As at December 31, 1960.

	Number Farmers Served	Number Non-Farmers Served	Total Number Customers	Circuit Miles of Line
A. Within the Interconnected system				
Calgary Power Ltd.				
Experimental Areas and Individual Rurals (1)	4,154	918	5,072	2,456
R.E.A.'s	32,960	5,922	38,882	23,444
Canadian Utilities Limited				
Experimental Areas and Individual Rurals (1)	758	110	868	398
R.E.A.'s	10,389	860	11,249	9,253
Northland Utilities Limited - Athabasca System				
Experimental Areas and Individual Rurals (1)	3		3	2
R.E.A.'s	589	30	619	456
East Kootenay Power Co. Ltd.				
R.E.A.'s and Lundbreck Co-op.	142	51	193	144
Adjacent to Cities, etc. (1)	195		195	84
Total Group A.	49,190	7,891	57,081	36,237
B. Peace River Country				
Canadian Utilities Limited				
Experimental Areas and Individual Rurals (1)	113	99	212	65
R.E.A.'s	2,004	109	2,113	1,687
Northland Utilities Limited				
Experimental Areas and Individual Rurals (1)	125		125	24
R.E.A.'s	1,663	160	1,823	1,583
Total Group B.	3,905	368	4,273	3,359
C. Isolated Towns Served by Northland Utilities Limited				
Company-owned Rurals (1)	1		1	1
R.E.A.'s	55	2	57	94
Total Group C.	56	2	58	95
GRAND TOTAL:	53,151	8,261	61,412	39,691

(1) The lines to serve these farms are the property of the Power Companies. This mileage is also included in the table showing transmission lines under the heading 2,300 to 22,000 volt lines, etc.

TABLE NO. 17

DATA RE CENTRAL STATIONS IN ALBERTA BY REGIONAL GROUPS
As at December 31, 1960.

	Group A	Group B	Group C	Total
Plants				
K.W. Rating	883,120	27,200	6,693	917,013
K.W.H. Generated (thousands)	3,050,342	65,258	10,949	3,126,549
Transmission				
Miles of Line	12,063	1,015	48	13,126
Distribution				
Number of customers	339,414	14,276	1,764	355,454
K.W.H. sold (thousands)	2,636,688	52,110	10,652	2,699,450
Miles of line	4,577	395	62	5,034
Rural				
Number of farms (1)	49,190	3,905	56	53,151
Number of non-farms (1)	7,891	368	2	8,261
Miles of farm line (2)	36,237	3,359	95	39,691
Miles of R.E.A. line (3)	33,297	3,270	94	36,661

(1) Included in Number of Customers shown under Distribution.

(2) Partly included in Number of Transmission Lines.

(3) Not included in Miles of Line shown under Distribution or Transmission Lines.

The following is a more detailed summary of the additions to generating capacity, transmission line facilities, etc., during the year 1960.

Calgary Power Ltd.

(1) Changes in Plant Capacity

During 1960 work was completed on extensions to the Spray and Rundle hydro plants. This has added a 50,000 kilowatt unit to the Spray Plant and a 30,000 kilowatt unit to the Rundle Plant.

Work is continuing on the Brazeau Storage and Power Development. The initial development consists of a storage reservoir of some 275,000 acre-feet capacity scheduled for completion in the fall of 1962 and a powerhouse containing an initial unit of 150,000 kilowatts scheduled for operation in the fall of 1964.

Work was started on an extension to the Wabamun Steam Plant which will add a 150,000 kilowatt unit in the fall of 1962.

(2) Additional Transmission Lines

During the year 1960 Calgary Power Ltd. built the following transmission lines:

Obed to Hinton	138 KV	17.2 miles (now operates at 23 KV)
Edmonton to Holden	138 KV	62.5 miles (new line built) 52.5 miles (69 KV line salvaged)
Spray to Horseshoe	138 KV	20.2 miles
Whitecourt to Judy Creek	69/23 KV	28 miles (now operates at 23 KV)
Herrington to Fort Macleod	138 KV	61.4 miles
Tap from Herrington to Fort Macleod line to Vulcan	138 KV	6.0 miles
Blackfalds to Joffre	22 KV	7.0 miles

New substations and substation changes during the year 1960 are as follows:

Holden and Bardo - The company's 69 KV transmission line from the East Edmonton substation to Holden has been reconstructed for 138 KV operation resulting in the construction of a new substation at Bardo and additions to the Holden substation as follows:

Holden - 25,000 KVA, 138/72 KV auto transformer and two 72 KV OCB's installed in the Wainwright and Canadian Utilities Vegreville lines.

Bardo - 18,750 KVA, 138/72 KV auto transformer and a 72 KV OCB in line to Camrose have been installed.

A tap has been added to the company's Calgary to Medicine Hat 138 KV transmission line near Blackie, resulting in the following changes at Blackie, Vulcan, and Fort Macleod:

Blackie - A 138 KV OCB has been installed in the Medicine Hat side of the Blackie tap to Fort Macleod and motor operated airbreak switches installed in the lines from East Calgary and to Fort Macleod.

Vulcan - 6,000 KVA, 138/23.9 KV transformer and 23.9 KV OCB's in lines to High River and Lethbridge have been installed. (This load was previously supplied from High River and/or Lethbridge).

Fort Macleod - 25,000 KVA, 138/72 KV auto transformer and three KV OCB's in lines to Lethbridge, Calgary and Bellevue have been added.

High River - 10,000 KVA, 72/23.9 KV transformer has been installed replacing a 6,000 KVA, 72/23.9 KV transformer.

Red Deer - One 15,000 KVA and one 12,000 KVA, 138/23.9 KV transformers have been installed replacing two 6,000 KVA, 138/23.9 KV transformers.

N.E. Lacombe - 6,000 KVA, 138/23.9 KV transformer and three 23.9 KV OCB's in lines to Red Deer, Wetaskiwin, and Bashaw have been installed. (This load was previously supplied from Red Deer and/or Wetaskiwin.

Calder - A 72 KV OCB has been installed in the line to Inland Cement near Edmonton.

Inland Cement Substation - Two 5,000 KVA, 72/4.16 KV transformers have been installed, replacing a 6,000 KVA, 23.9/4.16 KV transformer.

Spray Plant - A 45,000 KVA, 13.8/138 KV transformer associated with the newly installed #2 unit has been added. The 138 KV oil circuit breakers have been removed and five 138 KV airblast circuit breakers have been added. Rundle - A 25,000 KVA, 13.8/138 KV transformer has been added to accommodate the second unit and the capacity of the existing 18,750 KVA transformer has been increased to 25,000 KVA by the addition of forced cooling.

(3) During the year the following Towns, Villages and Hamlets were added to the system of Calgary Power Ltd.:

Hamlets:
Czar Lake
Blissful Beach - (Sylvan Lake)
Edmonton Beach
Gardner's Cove
Kinbrook Park
Lac la Nonne
Moonlight Bay
Obed
West Bay

(4) Service to Oilfields, New Industries, etc.

New oilfields served during the year 1960 were Carson Creek, Judy Creek, Medicine River and Crossfield-Carstairs, although the majority of the new load was still in the Pembina oilfield. Over 300 oil well pump services were connected, and about 50 field gathering pump services. In addition, a number of services were connected in oilfields for other uses, totalling about 2,000 HP, being mainly for secondary recovery purposes. However, due largely to unitization in oilfield areas, about 175 oil well pump services and 38 field gathering pump services were disconnected during the year. The company is now supplying about 4,100 oil well pump services and 635 field gathering pump services.

There was an increase of about 1,500 HP in the load of oil refineries, consisting of about 1,000 HP in a new refinery near Bowden, and additions to refineries at Edmonton and Wainwright. About 900 HP additional load was obtained from gas processing plants placed in operation at Innisfail and Carstairs.

Construction service and arrangements for permanent service were completed for two chemical plants in the Edmonton area totalling about 1,500 H.P. These plants are to be in operation next year.

Additional new services during the year were provided to the new Edmonton International Airport operation, a steel pipe plant, an insulation products plant, totalling about 2,000 H.P. and also to a building material plant, feed mills, radio station and other smaller industrial loads. Good growth was experienced in the energy delivered to the coal industry this year due to the export of coal from the Crowsnest Pass area.

Canadian Utilities Limited

(1) Changes in Plant Capacity

During 1960, Canadian Utilities Limited completed construction of the transmission line from the Sturgeon Plant to the newly planned town of Swan Hills. As a result the Swan Hills plant, with a capacity of 750 K.W., was no longer required, and the units were earmarked for the company's Yukon and Smith plants. A diesel plant with a capacity of 150 K.W. was installed to supply power to oil companies operating in the new Simonette oilfield, south of Grande Prairie. A 48 K.W. diesel unit was purchased to supply Anzac, an isolated community south of McMurray.

(2) Transmission lines and substations

During 1960, Canadian Utilities' expenditures on new transmission lines and substations amounted to approximately $850,000.00.

(a) Transmission Lines.

Bonnyville to Cold Lake Airport - 28 miles, 69 KV - built to provide increased capacity and a second circuit for continued maintenance of reliable service to customers in this area.

Sturgeon Plant to Swan Hills - 90 miles, 69 KV - started in 1959 and completed this year. This includes 10 miles of line to serve the pipeline terminal pumping station.

Sarah Lake to Judy Creek - 9 miles, 69 KV - built for oilfield loads. Completion of this line made it possible to feed the Swan Hills from the south. However, since the line has a relatively small capacity it will be used only under emergency conditions.

(b) Substations

South Stettler - 23.9 KV, 5000 KVA - voltage regulator to maintain adequate voltage for industries in this area.

Cold Lake - 69/4.16 KV, 3750 KVA - substation to supply part of the airbase load.

Virginia Hills - 69/23.9 KV, 1500 KVA - new substation.

Swan Hills - 69/23.9 KV, 1500 KVA. 69/2.3 KV, 3000 KVA - new substation, new substation for pipeline terminal.

Sturgeon Plant - 69 KV - three oil circuit breakers for the High Prairie - Swan Hills lines.

(3) Towns and Villages added to the Company's system in 1960

Anzac
Simonette (Camp)
Virginia City (Camp)

(4) Service to Oilfields, New Industries, etc.

Late in 1960, the company began serving the Simonette oilfield, and continued to extend service to wells and batteries in the Swan Hills-Virginia Hills-Sarah Lake areas. A 1,000 H.P. pipeline pumping station was connected at the terminal of the Swan Hills pipeline, doubling the potential capacity of this line. The total expenditure in extending service to oilfields served by the company exceeded $200,000.00 in 1960.

Other new loads connected during 1960 included: A U.S. Air Force refueling base which is operated in conjunction with the R.C.A.F. Station at Cold Lake; a modern telephone exchange in Grande Prairie; a 14,630 watt television station at Lloydminster; a television satellite station near Coronation, and five micro-wave sites and repeater stations.

A notable trend is under way in street lighting in several of the communities served by the company which have installed mercury vapor luminaires

in their business sections and are proceeding to convert residential areas to mercury vapor lighting.

City of Edmonton

Changes in Plant Capacity

During the year a 75,000 K.W. steam turbine was installed in the City's plant. This brings the total capacity of the City's plant to 260,000 K.W. which makes it one of the large steam plants in Canada.

City of Lethbridge

Changes in Plant Capacity

During the year the City of Lethbridge installed a 10,000 K.W. gas turbine.

In general considerable substation and transmission capacity has been added during the year to keep pace with the remarkable growth of load in the main interconnected system and in the Peace River country. Considerable growth has been experienced in the oil fields in the Swan Hills and associated areas.

From its Valleyview plant Canadian Utilities Limited supply some light loads for some 60 miles south and east along the highway, so that there the gap between the two companies is gradually closing. The result is that the Peace River system, fed in part by the Valleyview plant, will be coming into contact with lines from the main interconnected system at Judy Creek and near Fox Creek. These lines are very light and are not capable of transferring power between the two interconnected systems. This condition will probably continue to exist for a number of years because the load in the Peace River country is not large enough to warrant building a transmission line with enough capacity to feed power into the Peace River area.

As the load in the Peace River area grows the following three sources of power all present possibilities;

1. A central thermal plant.
2. Power from Wabamun, etc.
3. Power from the Peace River Power Development Company Limited at Hudson Hope.

Of these three the last seems to be most likely at the moment. Once the Peace River Power Development is completed and loaded there should be some cheap power available. If all of the power used in the Alberta portion of the Peace River country, however, were to be drawn from this source it would amount to one-half of one percent of the output of that plant. The unit cost of transmitting this small amount of power will be high so that it will probably have little effect in reducing the cost of power in that area. There has been some discussion about building a larger line to send power into the Edmonton area from Hudson Hope, but it is doubtful if this would be economical.

Alberta is so richly endowed with energy resources from which we can produce cheap power that, costwise, except for local areas, imported power cannot compete.

As well as having two million H.P. of undeveloped hydro power, Alberta, with its oil, gas, tar sands and coal, has some 80% of all of Canada's known fossil fuels.

A popular fallacy is that hydro power is always cheaper than thermal. In Alberta this is not so. By far the cheapest power in Alberta today is that which we get from the Wabamun gas-fired steam plant. In 1962 that plant will switch over to using coal as fuel and will then produce power even more cheaply than it does now.

Because of the nature of Alberta's fuel resources, the ideal

arrangement would be to generate some 94% of the K.W.H. needed in the Province in steam plants, leaving the remaining 6% to be generated by hydro plants. The peak load in the Province during 1960 was 719,000 K.W. Since the capacity to supply much of this load is only needed for such short intervals of time, the hydro plants, generally speaking, are well suited to perform this function. Hydro plants representing about 40% of the generating capacity of the Province would be required to carry the necessary portion of the peak load and in doing so would generate approximately 6% of the K.W.H.

Peak load is a major headache for all power companies. All together the capacity of Alberta's power plants is some 900,000 K.W. Now, if we look back at the load which we had on these plants during 1960, the situation is approximately the following:

2% of this, or 18,000 K.W. was used for 1 hour only in November.

4% of this, or 36,000 K.W. was used for only 2 hours in November.

10% of this, or 90,000 K.W. was used for only 11 hours.

20% of this, or 180,000 K.W. was used for only 204 hours spread over November, December, January, February and March.

That is, 180,000 K.W., or 20% of our capacity was used for only slightly over 2% of all the hours in the year, and in doing so only generated 2/10 of 1% of all the K.W.H. used in the Province.

Now, because 20% of our installed capacity is only called into use for 2% of the time in any one year and that then it only generates 2/10 of 1% of the year's power, we find it economical to use our Alberta rivers for producing this kind of peak power. As compared to the rivers in Manitoba, Ontario and Quebec and those in British Columbia, the flow of our rivers does not lend itself to producing power which we need 24 hours a day and 365 days in the year. The reason is that nearly all the water comes rushing down from the mountains during May and June and then for the rest of

the year the rivers are almost dry. Our greatest demand for power does not occur during these months of early summer so our hydro plants and dams are built so as to store the summer water for use during the peak load periods of the winter.

There are several hydro sites which can be developed when more peaking power is needed. Some of these are on the Bow River and, of course, the Athabasca River has a large potential capacity. At the moment the Big Bend No. 1 site on the Brazeau is being developed. During the past year the coffer dam was built and construction will continue during 1962 and 1963. Ultimately this site will produce 600,000 K.W. in four units of 150,000 K.W. each. The complete development includes a main dam two miles long with a maximum height of 250 feet, and two auxiliary dams. It will store 930,000 acre feet of water and will have an area of 37 square miles.

At the moment perhaps the most interesting feature of the Brazeau Dam is its ability to regulate the flow of water in the Saskatchewan River and to increase the low flow during the winter months. There is an urgent need to provide early relief to the polution problem which exists in the North Saskatchewan River below Edmonton during the low water period from October to April. This objective can be accomplished by building the lower part of the dam to permit storage of part of the site's ultimate water capacity. The lower part of the dam should be completed during the summer of 1962. Stored water to the extent of 150,000 acre feet will be available for release during the winter of 1961. In 1962 and subsequent years 300,000 acre feet will be available and ultimately when it becomes necessary the dam will be raised and will then provide 930,000 acre feet for polution control. While the low dam will be completed by 1962, the first generating unit of 150,000 K.W. is not expected to come on the line until 1964.

At the same time that hydro units are being installed it will be

necessary, of course, to keep adding units in the thermal plants to carry the base load. While detailed plans for the next five years are included under the section headed "Forecast to 1965", reference can be made here to some of the thermal units that are planned in the near future. At the moment construction leading to the installation of the third Wabamun unit - 150 M.W. coal-fired - is under way. The City of Edmonton will be installing another 75 M.W. gas-fired steam turbine which will come on the line during 1963 and Canadian Utilities Limited will bring a 30 M.W. gas turbine into service in the Fall of 1961 in its Vermilion plant, and is planning to install another 33 M.W. steam turbine in its Battle River plant in 1964. Another good power possibility that is not yet completely in focus is an extension of the City of Edmonton generating system by locating a coal-fired steam plant in some large coal field such as that on the south side of Lake Wabamun.

Unlike some other regions in Canada where the power authorities are forced to contemplate installing nuclear power or to reach out hundreds of miles to bring in power from the hydro sites of the north, Alberta is abundantly supplied with sources of relatively cheap power. The problem is not one of searching for sites for power plants either thermal or hydro but is rather one of bringing into production whatever may be the most economical site at any given moment. The keynote of Alberta's planning, then, should be to make certain that at any time the next power plant to be built should be the one that will contribute the cheapest power to the excellent network of transmission lines which forms the backbone of the power system of the Province.

In the light of the rapidly rising cost of all commodities and services and of material and labour, the power producers and distributors have done a remarkable job in keeping the retail cost of power down.

Electric power is one of the very few commodities or services in Alberta that has not risen in price. While in many parts of Canada rates for power have had to be increased, the private power companies have so far been able to stave off such an increase, and much credit is due to them for their economical planning. How long they can continue to keep from raising rates is hard to say, but we may hope to see this condition continue for at least a few years to come.

As shown by the map at the back of the Report, the network of high-voltage transmission lines is expanding and being co-ordinated year by year. The major power producers, Calgary Power Ltd., the City of Edmonton, Canadian Utilities Limited and Northland Utilities Limited, are bringing about inter-connections which have the effect of utilizing their generating equipment to its utmost efficiency and this process will continue. For this reason Calgary Power proposes starting a 345 K.V. grid connecting the Wabamun plant with the main load centers of Calgary and Edmonton. Initially lines of 220 K.V. would serve the purpose and cost less, but if their rapid obsolescence is taken into account their carrying charges would be more in the long run.

Calgary Power Limited Photo

Cypress R.E.A. meeting - members discuss their electrification problems.

FORECAST TO 1965

At December 31, 1960, the capacity of the power plants in the Province was 917,000 K.W. At December 31, 1950 - 10 years ago - this capacity was 208,000 K.W., so that the increase during the 10 year period has been 340%, an amazingly large increase. The K.W.H. generated in 1960 were over three and one-half times the amount generated 10 years ago and showed an increase of more than 10% over the corresponding figure for 1959. The increase in peak load over 1959 was 10%. The peak day occured in December even though that was a relatively mild month. Due to the fact that we have had two or three mild winters the peak load has not reached proportions which we might have expected if cold weather had prevailed. We may look for a considerable jump in peak load whenever we experience a severe December.

While a rate of increase of 10% in K.W.H. generated with a corresponding increase in peak load is high, we anticipate that the Province's electrical load will continue to grow at a higher rate than this for the next few years. The population of the Province is increasing, new industries are coming in and the prospects of the gas export are all factors that will keep Alberta's rate of electrical growth very high.

Table No. 18 shows the growth which we believe will take place in the electrical load of the Province from now until 1965. It shows the actual capacity in K.W. of the power plants in the Province as at December 31, 1959, the increase in capacity during 1960 and the estimated peak load that occurred in 1960. It then goes on to deal with these year by year until 1965, showing our forecast of peak load and what the Companies and Municipalities are planning to do to meet that load.

It will be seen from a study of Table 18 that there was ample reserve capacity to meet the load in 1960. The Power Commission has always

felt that there should be enough reserve capacity in the power plants of the Province so that if the largest unit should break down during the December or January peak load period there would still be enough capacity to carry the load. The largest units in the Province at the moment are the large generators in the Wabamun and Edmonton plants. If any of these had broken down during the peak load in December, 1960, the various power plants, by pooling their resources, could have carried the load.

It appears that if the present plans for additional units are carried out we should have ample reserve capacity until 1965. It is hard to predict what the peak load will be five years from now. It will be noted from Table 18 that, while base load units at Wabamun and Battle River are planned, much of the emphasis over the next five years is going to be on peak load units. The first unit at Brazeau is expected to come into operation during 1964. Canadian Utilities Limited is installing a gas turbine at Vermilion for peaking purposes. It is anticipated that the provision of these peaking units will permit the steam units to run at a higher load factor and that it may make it possible to give consideration to deferring for perhaps a year the installation of some steam turbines.

TABLE NO. 18

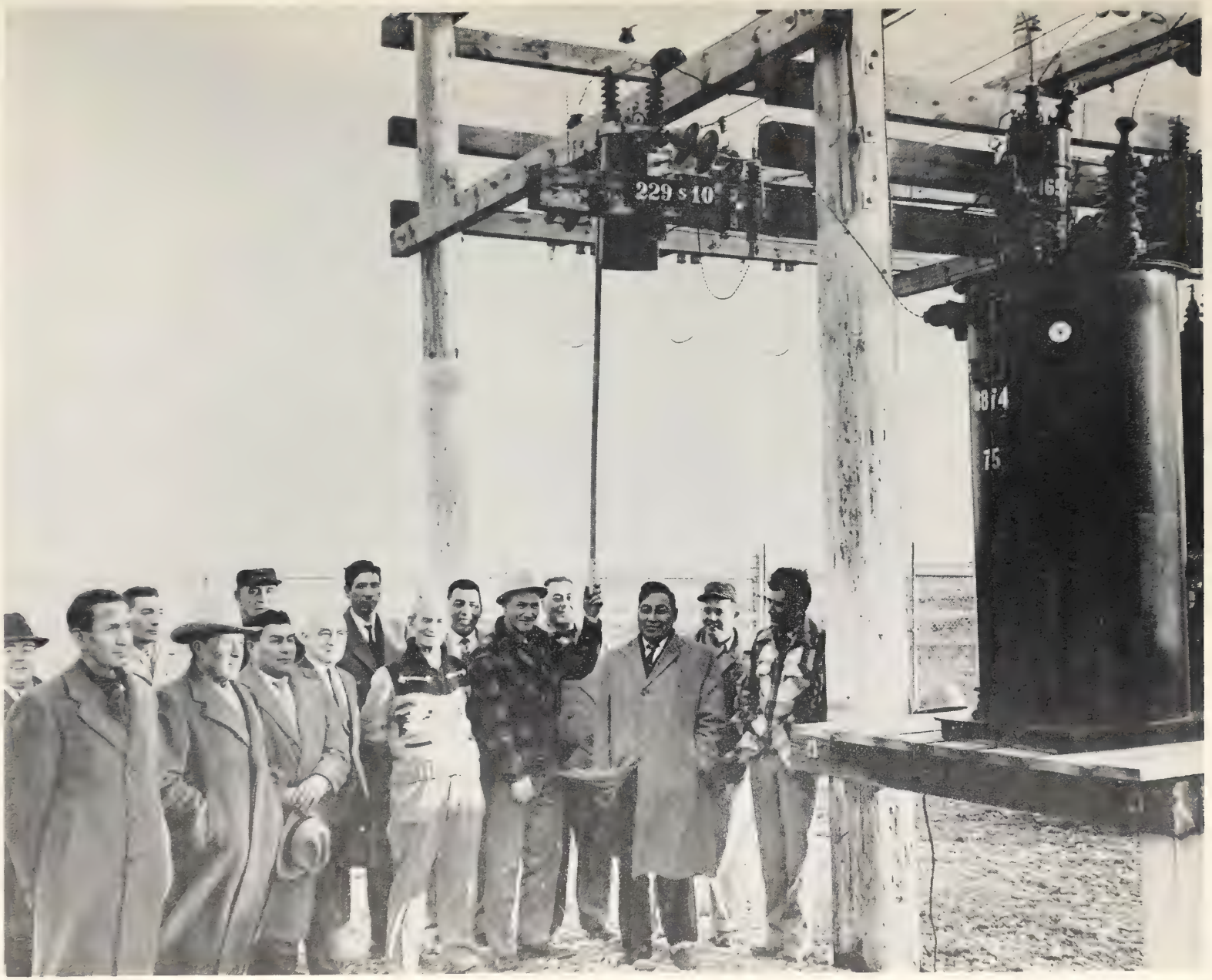
Forecast of Generating Capacity in K.W.
(Not taking account of isolated small plants)

	Capacity added during year	Capacity at end of year	Estimated Peak Load
Capacity at Dec. 31, 1959		749,600	652,000
Capacity added during 1960			
City of Edmonton - steam turbine	75,000		
City of Lethbridge - gas turbine	10,000		
Calgary Power Ltd. - Spray	50,000		
Calgary Power Ltd. - Rundle	30,000		
Northland Utilities Ltd. - Fairview	3,000		
Capacity added during 1960	168,000		
Less minor adjustments	- 587	167,413	
Total capacity Dec. 31, 1960		917,013	
		say 917,000	719,000
Capacity to be added 1961			
Canadian Utilities Ltd. - gas turbine	30,000		
Capacity to be added 1961	30,000	30,000	
Total capacity Dec. 31, 1961		947,000	852,000
Capacity to be added 1962			
Calgary Power Ltd. - Wabamun	150,000		
Northland Utilities Ltd. - Fairview	5,000		
Capacity to be added 1962	155,000	155,000	
Total capacity Dec. 31, 1962		1,102,000	965,000
Capacity to be added 1963			
City of Edmonton - steam turbine	75,000		
Northland Utilities Ltd. - Jasper	1,200		
Capacity to be added 1963	76,200	76,200	
Total capacity Dec. 31, 1963		1,178,200	1,078,000

carried forward -

TABLE NO. 18
continued

Totals brought forward		1,178,200	1,078,000
Capacity to be added 1964			
Canadian Utilities Ltd. - Battle River	32,000		
City of Lethbridge	20,000		
Calgary Power - Brazeau	150,000		
Capacity to be added 1964	202,000	202,000	
Total capacity Dec. 31, 1964		1,380,200	1,195,000
Capacity to be added 1965			
City of Medicine Hat	20,000		
Capacity to be added 1965	20,000	20,000	
Total capacity Dec. 31, 1965		1,400,200	1,316,000



Lethbridge Herald Photo

Setting the switch at Glenwood substation for power distribution to the Blood Indians. Group includes Senator James Gladstone, Head Chief Shot Both Sides and representatives of Farm Electric Services Ltd.

At December 31, 1961, with 53,151 farms electrified, the construction program is slowing down. Service was extended to 3,228 farms during the year and we expect to add some 2,500 more during 1961.

According to the 1956 Census, 79,424 farms were being operated in Alberta but only 70,058 of these were farms on which someone lived. The remaining 9,366 were being operated mainly by farmers who lived in towns or villages but did not live on their farm. Of these 70,058 farms, 739 were on Indian Reserves. By the end of the year 595 Indian farmers on the Blood, Samson, Montana, Michele and Enoch Reserves had obtained service. If we accept the Census figures, which were compiled during the summer of 1956, then 76% of all farms were electrified as at the end of the year.

But it is sometimes difficult to find all the farms that the Census shows. Since 1956 and particularly in the grey-wooded soil areas, many farmers have left their land. The Saskatchewan Power Corporation conducted a survey during 1958 and came to the conclusion that at that time there were only 91.5% as many farms in that Province as were reported by the Census a year or so previously. If we presume that this percentage holds true in Alberta then there should be 91.5% of 70,058, or 64,000 farms in the Province on which someone, including Indians, lives. If that is the case then, at the end of 1960, 83% of all the farms were electrified.

The map on Page 39 shows the Census Divisions in the Province as at 1956, and also shows diagrammatically the percentage of the farms in each Division which were electrified at the end of December, 1960. This percentage is based on the number of farms on which someone lived at the time of the 1956 Census.

It will be seen by the map, which shows the saturation of farm electrification by Census Divisions as at December 31, 1960, that throughout the richest farming areas (Census Divisions 2, 3, 5, 6, 8 and 11) the saturation is very high

and that it becomes less in Divisions 1, 4, 7, 10 and 13. Census Divisions 12, 14 and 15, include the fringe areas where agricultural income is the least and where, therefore, we might expect to find a smaller percentage of the farms electrified. Even in these areas, however, a very complete framework of farm lines exists. It is these areas that have benefited most by the application of Part II of the Revolving Fund Act. The future increase in the number of farms electrified will be generally confined to these areas.

It is not likely that very many more farms will be connected in Census Divisions 2, 3, 5, 6, 8 and 11. It is also unlikely that the saturation of electrified farms in Census Divisions 1 and 4 will ever increase into the 90% range because many of the farms and ranches in these two areas are so far removed from their nearest neighbours that for them farm electrification is impractical. On the other hand, we expect a large increase in the saturation in Census Divisions 12, 13, 14 and 15. Generally speaking, the existing network of lines covers these Divisions so completely that the lines are within a mile or two of a very high percentage of the farms in them. Here and there around the fringes of settlement there may be 6 or 7 small groups of 15 or 20 farms each which, because they may be isolated by a gap of 5 miles or so from the nearest farm adjacent to existing lines, have not found it practical to get service. In other words, except for the farms in the Keg River and Fort Vermilion areas the network of lines makes it possible for nearly all farms to hook up.

There are approximately 40 farms in the Keg River area and some 250 in the vicinity of Fort Vermilion and in the area west from there to High Level. Those in the Keg River area are at present too far removed from any source of power to make electricity economically attractive to them. The farms from High Level to Fort Vermilion and down into the LaCrete area have power available from Northland Utilities' plant at Fort Vermilion. A Rural Electrification

Association has been formed in that region but so far there appears to be little interest in building lines.

When the farms not yet electrified but adjacent to lines will take service is another matter. Our experience in all areas south of Edmonton indicates that once the lines are built the farmers who could have taken service from them but did not hook up originally, came on within 5 or 6 years. Some 85% of the 3,228 farms hooked up in 1960 were served by short taps off existing lines. While in the part of the Province from about Edmonton south the process of the reduction of the number of farms due to consolidation into larger units appears to have almost reached a limit for the time being, this process is still going on in Census Divisions 12, 13, 14 and 15. There are many farmers who have power lines going past their doors who have not taken service due to uncertainty on their part as to whether or not they are going to stay on the farm. It is possible that the very fact that power is available will be sufficient to induce them to remain on the farm, but essentially that decision will have to be made on the basis of farm economics.

The following table shows the number of farms connected as of December 31st, 1960, as well as those still under construction. It also shows the number of non-farm customers served off farm lines.

While there are 53,151 bona fide farmers connected, farm electrification also served 8,261 non-farm customers who would not have obtained service otherwise. The total number benefiting by the construction of these farm electrification lines is, therefore, 61,412.

At the end of December, 1960, there were 39,691 miles of farm lines and during the year 1,695 miles had been constructed.

TABLE NO. 19

ALBERTA POWER COMMISSION

Combined figures for Alberta

Farm Electrification as at December 31, 1960.

	No. Farms Connected	Non-Farms	Hamlet Customers	Total Non-Farm Customers	Total Served off Farm Lines
Experimental Areas	3,228	666	461	1,127	4,355
Completed R.E.A.'s	47,795	3,115	4,019	7,134	54,928
Individual Rurals	1,934				1,934
Farms supplied by Cities	195				195
Total Actually Served	53,151	3,781	4,480	8,261	61,412


McMurray
15
12
Peace River
Grande Prairie
Athabasca
13
14
Edson
EDMONTON
11
10
WETASKIWIN
CAMROSE
Jasper
Wainwright
8
7
RED DEER
9
DRUMHELLER
Youngstown
4
Banff
6
5
CALGARY
2
MEDICINE HAT
LETHBRIDGE
1
3
Cardston
Over 85%
70 to 85%
50 to 69%
Less than 50% - White
PROVINCE OF
ALBERTA
CENSUS DIVISIONS
1956
ALBERTA POWER COMMISSION
Electrified farms as at December, 1960, as a Percentage of Farms on which someone lives according to 1956 Census.

Financing

At the end of December there was a total of 369 active Rural Electrification Associations. These Associations have borrowed under both the Guarantee Act and the Revolving Fund Act and the total of these borrowings has been approximately $39,000,000.00. At December 31, 1960, over $21,700,000.00 of this had been paid back. The investment in all rural lines in the Province is approximately $53,500,000.00.

The Rural Electrification Revolving Fund Act has been of great assistance to all farmers who have been connected during the past several years. By the end of 1960 the Power Commission had given approval to 2,502 applications for loans under Part I of this Act. While all of this money had not been borrowed by the end of December, the approvals covered 31,381 farmers at an estimated cost of nearly $37,500,000.00.

During 1960 the Power Commission gave approval to 380 applications for loans under Part I of the Revolving Fund Act for an amount of $3,257,000.00, to give service to 2,502 farms. Of this amount $3,051,000.00 was loaned where no Part II loan was necessary. Of the 2,502 farmers signing contracts under the Revolving Fund Act, 148 of them were in areas that needed the assistance of Part II loans. In such areas Part I loans totalling $206,000.00 were approved in conjunction with Part II loans totalling $88,000.00. The framework of lines in these new Part II areas will make it possible for an additional 275 farmers to connect to them whenever they are ready.

Since the inception of Part II loans an amount of $1,698,922.00 has been approved. As at December 31, 1960, $862,285.00 has been paid back. Out of a total of 253 Part II loans which have been issued, 60 have been repaid in full and a great many more are nearly all paid off.

The existence of Part II loans made it possible to build a framework of lines in areas which otherwise could not have obtained service. There were 8,897 farmers in these areas and initially 3,597 of them took advantage of this financial assistance to get their lines built. When the remainder of the farmers in these areas take service it will be possible to pay off the outstanding balance of the Part II loans. Part II loans have made it possible to extend lines to many areas of the Province which otherwise could not have had service. There are very few areas left now which do not have a network of lines and for this reason we do not expect very heavy demands for Part II loans from here on.

Checking Costs

During the year the Commission has checked all the cost statements which the companies send to R.E.A.'s showing the costs of building their lines. In addition to this, some field checks have been made on various farm areas. With very minor exceptions these costs have always been found to be correct. These checks further show that the areas have been constructed at cost. The Power Companies are building these areas at cost and from an engineering standpoint, they are building them efficiently.

The Power Commission feels that it is its duty, not only to investigate problems brought to it, but also to investigate any phases of farm electrification which it believes require study. While the building of farm lines appears very simple and the operation of them is taken for granted, nevertheless there are many intricate problems to be considered if we are to keep all expenses down to the very minimum. Many questions such as accumulation, investment and use of deposit reserves, monthly versus quarterly billing, card meter reading and operating charge per foot of line, all merit careful and continuous study. As each of these problems is solved a new one

arises to take its place. In its engineering and accounting aspects, farm electrification is highly technical and the individual farmer does not have the time nor the opportunity to investigate these matters. The Power Commission feels that one of its main responsibilities is to see that consideration is given to every factor that could possibly reduce the cost of electricity to the farmers.

The question of the correctness of operating charges made to farmers is constantly under study. We believe that the Power Companies are doing a remarkable job of keeping these costs down and of accounting to the farmers for them. In all the years to date, the actual costs have been less than the monthly charges made to the farmer in his power bill, so that at the end of each year the Power Companies have been able to make a refund to the deposit reserves of the Associations. The operating charges made in Alberta appear to be reasonable and compare very favourably with those made by R.E.A.'s who are operating in similar territory in the United States. One of the advantages gained by our farmers which enables the operating charges to be kept low is the rather unique method of operating R.E.A.'s in Alberta. While in the United States the R.E.A.'s are generally larger than they are in Alberta, each R.E.A. maintains its own supervisory, office and operating staff, with the result that its overhead is apt to be high. In Alberta where the expenses of operating R.E.A. lines are pooled over all the farmers being served by any one power company, and where, for instance, Canadian Utilities Limited does the operating for some 13,000 farms, and Farm Electric Services Ltd. does this work for some 37,000 farms, the overhead from a number of small offices is not added to operating expenses. In other words, these companies operate the farm lines and do the billing and accounting more efficiently than would be the case if this were being done separately by a number of small R.E.A.'s. Unfortunately the utmost efficiency in operating these lines is not enough to keep

pace with the inflationary rise in material and labour costs. As the lines get older more petty maintainance is becoming necessary and this adds to operating expenses. Increases in cost are gradually narrowing the spread between the actual costs and the nominal operating charge.

Deposit Reserves

The question of the adequacy of the deposit reserves being set aside has been under study for some years. Some of the older lines of the first R.E.A.'s are now approaching the midpoint of their useful life. In general it appears that most deposit reserves will be adequate but there will undoubtedly be some R.E.A.'s in which, because of their high mileage of line per farm, it may be desirable to increase the annual accrual. While the Power Commission has developed a method by which it can assess the adequacy of existing deposit reserves, many assumptions have had to be made. Some of these will prove to have been too optimistic or pessimistic but it is expected that the errors will compensate each other. If experience should prove any of these assumptions to be badly out of line our annual review will catch this trend before it has gone too far.

After discussing this problem with the Union of R.E.A.'s it was decided that the Power Commission should set up a system of records of the reserves of all R.E.A.'s. There are some 350 of these in the Province and a schedule has been set up so as to make a detailed study of the reserves of some 70 R.E.A.'s each year. In this way, starting with the older ones, the position of each R.E.A.'s reserve will be examined at least once every five years and more frequently if necessary. In cases where the deposit reserve appears to be building too rapidly, monthly payments might be suspended for a time or some rebate might be made. On the other hand, if the deposit reserve appears to be clearly inadequate the Power Commission could recommend to the R.E.A. that the monthly payment be increased. In this way

the position of the deposit reserve would be reviewed and revised periodically and any necessary adjustments could be discussed with the R.E.A. and the power companies.

The average K.W.H. used per farmer in Alberta today is 4,055 K.W.H. per month. This is higher than the national average and much higher than anyone could have foreseen ten years ago. This high use of power, while it is an indication of the value of farm electrification to Alberta farmers, is making it necessary to increase the size of substation transformers and in some cases to increase wire size on some feeders. Provision was made in the deposit reserve to allow for this and in those areas experiencing the heaviest use, this work is being done and is charged to the reserve. While the original lines were designed for what at the time was considered a high use, it was obviously impractical and too costly to build the lines to a heavier standard then. Doing so would have meant that the original farmers would have had to carry a uselessly high investment for many years.

We look upon the money being paid into deposit reserve by any farmer in any one year as his share of the depreciation that takes place during that year that he is using the line. Since the beginning of farm electrification in the Province some 20% of farms have changed hands and if we look down the road another 25 years most of the farms will have changed hands either by the original farmer selling out or by giving his farm to his son, etc. When he sells the farm he sells it at a price that will also pay the cost of the power line. If we take a farmer who has had power for 15 years, say, he sells the power line for at least what it cost him originally and leaves in the deposit reserve the money that he has paid year by year. The new man buys the farm and the power line on this basis. He can see that the power line has depreciated considerably but is willing to pay the full price for it because he knows that in the deposit reserve there is enough money to take

care of this depreciation. Theoretically what he has paid for is a piece of depreciated power line plus enough deposit reserve to make it as good as ever. In his turn he continues to make monthly payments to the deposit reserve until when the day comes that the line is worn out there is enough money to rebuild it.

The end result to the farmer who sold the line is that when he sold out he got back his original investment and has merely paid deposit reserve for the number of years he has used the line.

Peak Load

The annual use of electricity per farmer in Alberta during 1960 has been 4,055 K.W.H. In the aggregate the electricity consumed by farmers accounted for slightly over 6% of the total power sold in the Province. While the farmers use only 6% of the K.W.H. they are responsible for over 12% of the peak load. The percentage which the farmers will use of the K.W.H. generated in the Province will never be large. It is not likely at any time to exceed 7% of the total output.

But the total K.W.H. that the farmers use is not so significant as the peak load they impose on the generating and transmission facilities. The estimated combined peak load used for farm electrification is 90,000 K.W. This 90,000 K.W. is a large proportion of total plant capacity and consequently means that a large proportion of the companies' investment in plants and transmission lines is reserved solely for farmers. The companies' investment in this equipment which is reserved solely for the farmers' use will be well over $600.00 for each farm served.

The average farmer's electric load factor is very low and is something of the order of 27% as compared to a Province-wide load factor of about 50%. This question of load factor is an important one and while it confronts many industries, it bears most heavily on the gas and electric

utilities. The highest electric peak load of the year usually happens just before Christmas and may have a total duration of only an hour or so on two or three different days at that time of the year. The power companies have to install enough generating capacity to meet that peak even though for the remainder of the year all of this capacity is not used.

Once the generating capacity is installed, and this is particularly so of hydro plants, the cost of operating it 24 hours a day is not such a great deal more than the cost of operating it one hour a day. In other words, the cost of generating 24 K.W.H. per day with one K.W. of equipment, is not much more than generating one K.W.H. per day with one K.W. of equipment. This being the case, any customer such as a paper mill in the East, for instance, who can use a fairly constant amount of power for 24 hours a day for 365 days a year, can obtain this power very cheaply. Such a customer has a load factor of nearly 100%. An example of a customer at the other end of the scale would be a community hall used for only a few nights during the winter and therefore having a load factor of possibly 1%. The average load factor placed upon the plants in Alberta is about 50%, - that is, on the average the generators produce only one-half of what they could if the load was such that they could run steadily for 24 hours a day.

The 53,151 farms in the Province fall far below this average of 50% and have an actual load factor of about 27%. Some 90,000 K.W. of generating equipment has to be reserved solely for their use over the peak load period but for the year as a whole it is only used 27% as much as it could be. A rough calculation indicates that if farmers could improve their load factor to, say, 37%, then the cost per K.W.H. of the power supplied to them would be reduced about 25%

In order to improve their load factor farmers would not only have to use more electricity than they do now but would have to arrange their farming

operations so as to use the extra power at an off-peak period. While it is probably not possible to make major changes in farming practice in the use of electricity nevertheless this does present an avenue which would lead to reduced power bills so long as all farmers were to work towards that end. It is a subject towards which farmers might direct some thought in the hope of improving their load factor although in practice the cost of electricity is such a small part of the total operating cost of a farm that any saving effected in this manner would be very small. In any event, studies are under way between the Union of R.E.A.'s, the power companies and the Power Commission, to see what can be done to improve the overall load factor of farms.

BRITISH COLUMBIA

INTERPROVINCIAL BOUNDARY

SIXTH MERIDIAN

FIFTH MERIDIAN

FOURTH MERIDIAN

INTERPROVINCIAL BOUNDARY

ALBERTA

SASKATCHEWAN

29th BASE LINE

28th BASE LINE

27th BASE LINE

26th BASE LINE

25th BASE LINE

24th BASE LINE

23rd BASE LINE

22nd BASE LINE

21st BASE LINE

20th BASE LINE

CARIBOU MOUNTAINS 3207'

WATT MT. 2300'

BUFFALO HEAD HILLS 2600'

CLEAR HILLS 3500'

WHITEMUD HILLS

TROUT MT. 2350'

BIRCH MT. 2591'

THICKWOOD HILLS

PELICAN MT. 2682'

MARTEN MT.

PEACE RIVER PARK

LAKE ATHABASCA

Hay L.

Margaret L.

Jackfish R.

Chinchaga R.

Boyer R.

Vermilion

Vermilion Falls & Rapids

Ruis L.

Birch R.

Lake Clair

Maman L.

Chipewyan

Embarras R.

Richardson L.

Old Fort R.

Hutton R.

McLeod R.

Richardson R.

Marguerite R.

Keg River

Wadlin L.

Mikkwa R.

Buffalo R.

Wolverine R.

Wabiskaw R.

Bison L.

Legend L.

Namur L.

Athabasca R.

Firebag R.

Ells R.

Dover R.

Loon R.

Haig L.

Little Cadotte R.

Cadotte R.

Cadotte L.

Lubicon L.

Peerless L.

Graham L.

Chipewyan L.

Chipewyan R.

Mackay R.

RED EARTH

Peace River

Dunvegan

PEACE RIVER

Dawson Creek

Pouce Coupe

Spirit River

Heart R.

Kimiwan L.

McLennan

Utikuma L.

N Wabiskaw L.

WABASCA

S Wabiskaw L.

McMurray

Waterways

Clearwater R.

Rapid

ANZAC

Gordon L.

Cheecham

Garson L.

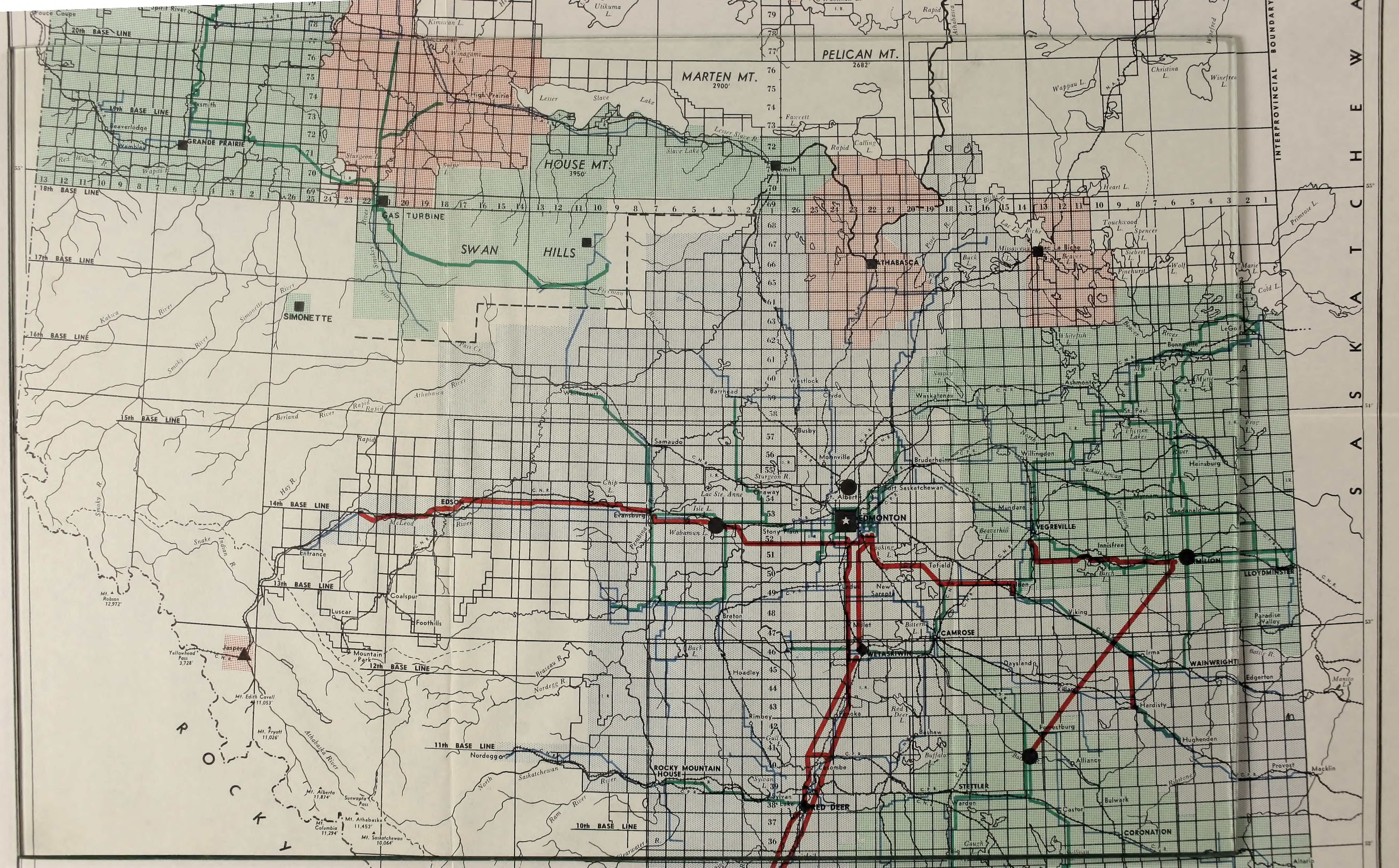
Lac La Loche

Christina R.

Christina L.

Winefred R.

Winefred L.



MARTEN MT.
2900'
PELICAN MT.
2682'
HOUSE MT.
3950'
SWAN HILLS
GAS TURBINE
GRANDE PRAIRIE
SIMONETTE
ATHABASCA
EDMONTON
VEGREVILLE
LLOYDMINSTER
WAINWRIGHT
CAMROSE
WETASKIWIN
RED DEER
STETTLER
CORONATION
ROCKY MOUNTAIN HOUSE
EDSON
Jasper
Evansburg
Entrance
Coalspur
Luscar
Foothills
Mountain Park
Nordegg
Barrhead
Westlock
Athabasca
Samaudo
Stony Plain
St. Albert
Morinville
Bruderheim
Mundare
Tofield
Viking
Irma
Hardisty
Hughenden
Alliance
Bulwark
Castor
Provost
Macklin
Edgerton
Paradise Valley
Bashaw
Buffalo
Sylvan
Rimbey
Hoadley
Breton
Daysland
Forestburg
Innisfree
Heinsburg
Willingdon
St. Paul
Ashmont
Waskatenau
Bonnyville
Lac La Biche
Smith
Slave Lake
Beaverlodge
Wembley
Sexsmith
High Prairie
Lesser Slave Lake
12th BASE LINE
13th BASE LINE
14th BASE LINE
15th BASE LINE
16th BASE LINE
17th BASE LINE
18th BASE LINE
19th BASE LINE
20th BASE LINE
11th BASE LINE
10th BASE LINE
INTERPROVINCIAL BOUNDARY
SASKATCHEWAN
ROCKY
Mt. Edith Cavell 11,033'
Mt. Fryatt 11,026'
Mt. Alberta 11,874'
Mt. Athabasca 11,452'
Mt. Columbia 12,294'
Mt. Robson 12,972'
Yellowhead Pass 3,728'

ALBERTA

PROVINCE OF ALBERTA CANADA

ALBERTA POWER COMMISSION
MAP OF
TRANSMISSION LINES
IN
PROVINCE OF ALBERTA

Scale: 1 Inch = 20 Miles

19 20 0 20 40 60 60

LEGEND

TRANSMISSION LINES 132 K.V. & OVER
" " 33 K.V. TO 72 K.V.
" " UNDER 33 K.V.

POWER PLANTS - STEAM
- HYDRO
- INTERNAL COMBUSTION

SERVICE AREA
CALGARY POWER
CANADIAN UTILITIES
NORTHLAND UTILITIES

ROCKY MOUNTAINS

INTERPROVINCIAL BOUNDARY

INTERNATIONAL BOUNDARY

MONTANA

COMPILED AND DRAWN IN THE TECHNICAL DIVISION, DEPARTMENT OF LANDS AND FORESTS, EDMONTON, ALBERTA